



Fire Sprinkler System Design Training Course: Hydraulic Calculations, Fire Pumps and Standpipes



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Introduction:

Fire sprinkler system design, with hydraulic calculations, fire pumps and standpipes, is the subject of this 5-day course for MEP consultants, fire protection contractors and facilities teams, who produce a sprinkler, pump and standpipe design package for a case building. Organisations often receive water-based suppression drawings with wrong hazard groups, undersized pipework or pumps that fail acceptance, causing redesign, delayed handover and weak protection. Nominees already prepare, check or maintain wet services and suppression installations, and teaching is by modelling build on layouts, hydraulic sheets and pump curves. CoreConcept Training Center delivers this sprinkler design course.

Course Objectives:

- Classify occupancies and commodities into hazard groups and select the matching sprinkler system type and design criteria
- Lay out sprinkler heads, branch lines and mains to spacing, coverage and obstruction rules in NFPA 13
- Calculate design flow and pressure for the hydraulically most demanding area and size pipework accordingly
- Select and specify a fire pump, driver, controller and pump room against NFPA 20 and the water supply curve
- Design wet and dry standpipe and hose outlet arrangements by class under NFPA 14
- Plan inspection, testing and maintenance routines for water-based systems using NFPA 25

Target Audience:

- Design consultants responsible for producing wet fire services drawings and calculations for buildings
 - Contractors who install, shop-draw and commission sprinkler, pump and riser systems
 - Facilities and asset maintenance staff accountable for keeping water-based suppression in service
 - Technical reviewers who check suppression submittals before approval
 - Plant and warehouse engineers who specify protection for storage and process areas
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Course Outline:

Day 1: Water-Based Suppression Principles and Hazard Classification

- NFPA 13 Scope, Terminology and System Components Overview
- Occupancy Hazard Classification From Light to Extra Hazard
- Commodity Classification and Storage Arrangement Effects on Demand
- Wet, Dry, Pre-Action and Deluge System Type Selection
- Existing Building Water Supply and Flow Test Assessment

Day 2: Sprinkler Selection, Layout and Pipework Arrangement

- Sprinkler Response Type, K-Factor and Temperature Rating Selection
- NFPA 13 Spacing, Coverage Area and Distance From Walls
- Obstruction Rules for Beams, Ducts and Cable Trays
- Tree, Loop and Grid Pipework Configuration Choices
- Hangers, Seismic Bracing and Riser Valve Assembly Details

Day 3: Hydraulic Calculations, Fire Pumps and Standpipes

- Density-Area Method and Remote Design Area Selection
- Hazen-Williams Friction Loss and Node Pressure Calculation
- NFPA 20 Fire Pump Sizing, Driver and Controller Selection
- Pump Curve, Churn and 150 Percent Rated Flow Checks
- NFPA 14 Standpipe Classes, Hose Outlets and Riser Sizing

Day 4: Special Water Systems, Failure Modes and ITM

- Water Mist System Principles and Typical Applications
- Foam-Water Sprinkler and Spray System Design Considerations
- Common Design Errors Found in Suppression Submittal Reviews
- NFPA 25 Inspection, Testing and Maintenance Frequencies
- Impairment Handling, Corrosion and Microbiological Influenced Corrosion Control

Day 5: Modelling Build of a Case Building Design Package

- Case Building Hazard Classification and Design Criteria Sheet
 - Case Sprinkler Layout With Coverage and Obstruction Checks
 - Case Hydraulic Calculation and Pipe Sizing Workbook
 - Case Fire Pump and Standpipe Selection Schedule
 - Sprinkler, Pump and Standpipe Design Package Completion
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Skills You Will Gain:

- Occupancy Hazard Classification
- Sprinkler Layout Drafting
- Hydraulic Demand Calculation
- Fire Pump Specification
- Standpipe System Sizing
- Water Mist and Foam-Water Appraisal
- Suppression Submittal Checking
- ITM Programme Planning

Why Attend This Course:

- Deliver a sprinkler, fire pump and standpipe design package that the project engineer or facilities manager can issue for review
- Decide whether a proposed hazard group, pipe size or pump rating will meet the hydraulic demand before drawings are issued
- Avoid failed pump acceptance tests, late redesign and costly pipework changes during installation and handover
- Coach junior designers and technicians on hydraulic sheets, pump curves and routine testing records

Conclusion:

Back at work, the participant hands the design package to the project engineer, the reviewing consultant and the facilities manager, who use it to approve layouts, order pumps and set up testing routines. Maintenance teams use the NFPA 25 schedule to plan weekly, quarterly and annual checks. After the first installation is tested, the team should compare measured flows and pressures with the hydraulic calculation, record any differences and update the design criteria sheet and pipe sizing workbook for later projects.

Frequently Asked Questions FAQ:

What should participants know before a fire sprinkler system design course?

Participants should understand basic fluid flow, read building drawings and have worked on or maintained wet fire services. Bringing a calculator or laptop with a spreadsheet tool helps during the hydraulic calculation and pump selection exercises.

How does this fire sprinkler system design course differ from a fire alarm or fire risk assessment course?

This course designs the water-based suppression itself: sprinkler layout, hydraulic calculations, fire pumps and standpipes. Fire alarm courses cover detection and notification, while fire risk assessment courses judge premises risk and manage protection at a management level.

Why do fire sprinkler system designs need hydraulic calculations rather than pipe schedules?

Hydraulic calculations prove that the water supply and pump deliver the required density over the remote area at the right pressure. Pipe schedules are limited and often oversize or undersize pipework, so calculated designs are preferred for most new systems.

What do participants take back to work from the fire sprinkler system design course?

Participants take back a design criteria sheet, a sprinkler layout with coverage checks, a hydraulic calculation workbook, a fire pump and standpipe selection schedule and an inspection, testing and maintenance plan for a case building.